

Position of mutations in MvP101, MvP102 and MvP103

FIG. 1A

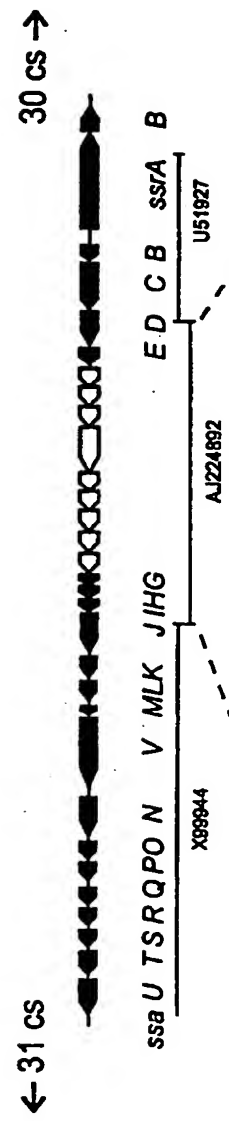


FIG. 1B

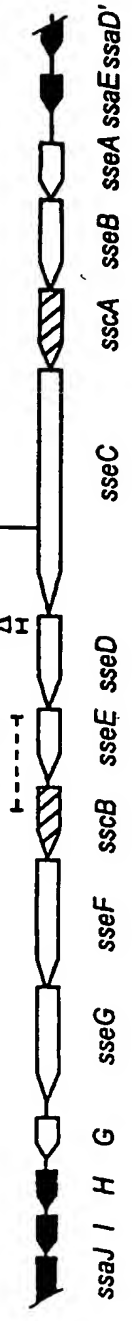


FIG. 1C

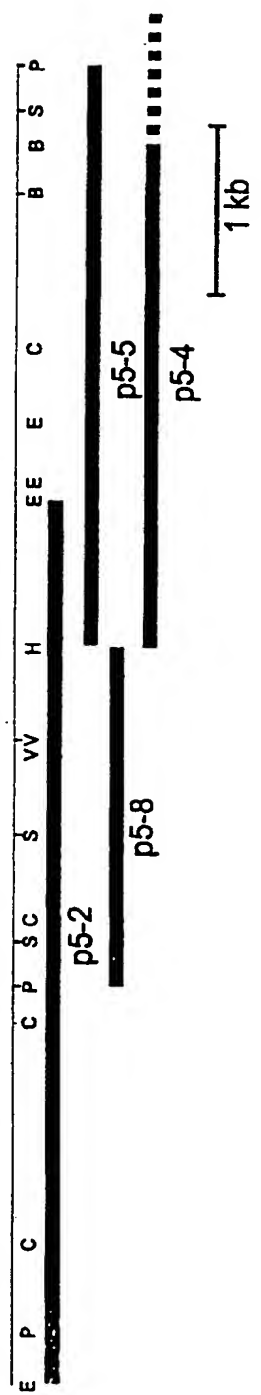


FIG. 2A

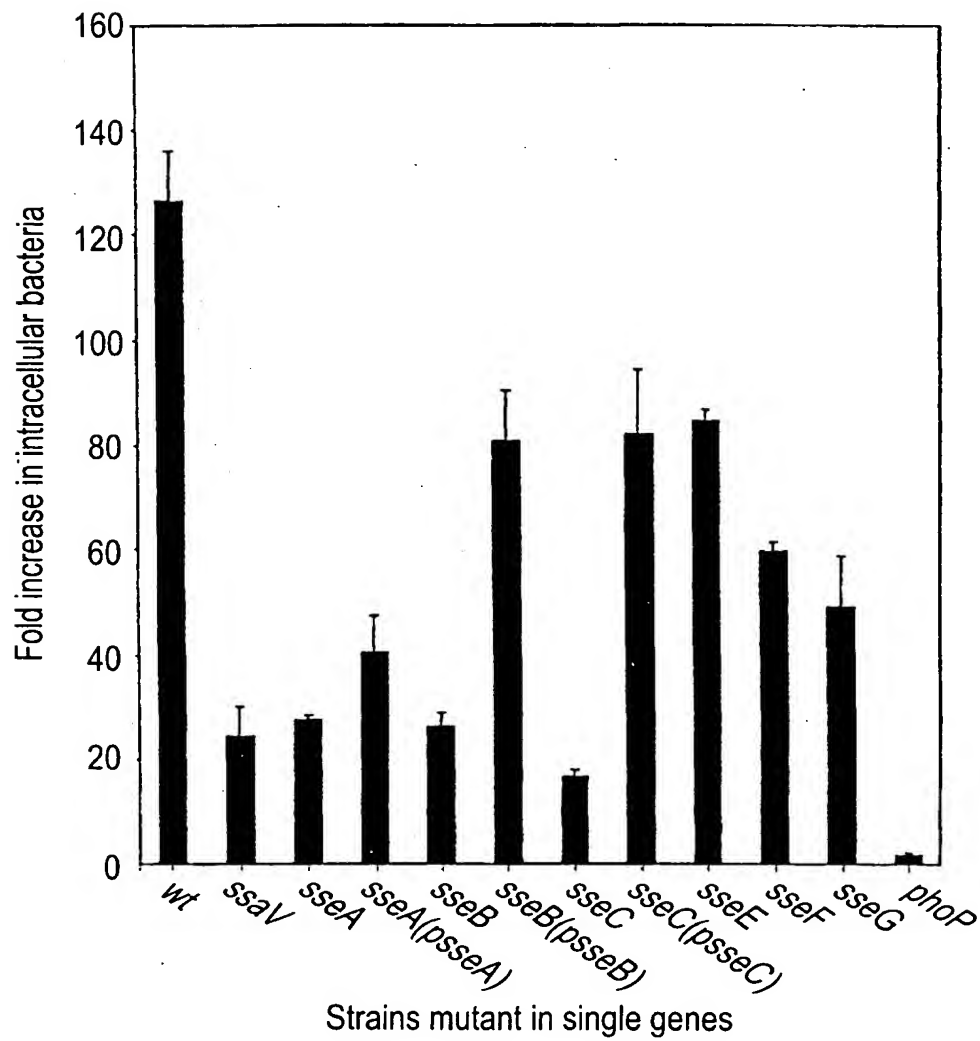
Alignment of SseB to EspA

SteB	1	M	S	S	G	N	-	I	L	W	G	S	Q	N	P	I	V	F	K	N	-	-	S	F	G	V	S	N	A	D	T	G	S	Q	D	D	L	S	Q	Q	N	P	F	A	E	G	Y	C	V	L	46		
EspA	1	M	D	T	S	T	T	A	S	V	A	S	A	N	A	S	T	S	T	S	T	S	M	A	Y	D	L	G	S	M	S	K	D	-	V	I	D	L	F	N	K	L	G	V	F	Q	A	A	I	L	M	F	49
SteB	47	L	I	L	M	V	I	Q	A	I	A	N	N	K	F	I	E	V	Q	K	N	A	E	R	A	R	N	T	Q	E	K	S	N	E	M	D	E	V	I	A	K	A	K	G	-	D	A	K	T	95			
EspA	50	A	Y	M	Y	Q	A	Q	S	D	L	S	I	A	K	F	A	D	M	N	E	A	S	K	E	S	T	T	A	Q	K	M	A	N	L	V	D	A	K	I	A	D	V	Q	S	S	D	K	N	A	99		
SteB	96	K	E	E	V	P	E	D	V	I	K	Y	M	R	D	-	N	G	I	L	I	D	G	M	T	I	D	Y	M	A	K	Y	G	D	H	G	K	L	D	K	G	L	Q	A	I	K	A	A	143				
EspA	100	K	A	Q	L	P	D	E	V	I	S	Y	I	N	D	P	R	N	D	I	T	I	S	G	-	I	D	N	I	N	A	Q	L	G	-	-	-	-	-	A	G	D	L	Q	T	V	K	A	A	141			
SteB	144	L	D	N	D	A	N	R	N	T	D	L	M	S	Q	G	Q	I	T	I	Q	K	M	S	Q	E	L	N	A	V	L	T	Q	L	T	G	L	I	S	K	W	G	E	I	S	M	I	A	Q	K	193		
EspA	142	I	S	A	K	A	N	N	L	T	T	T	V	N	N	S	Q	L	E	I	Q	M	S	N	T	L	N	L	L	T	S	A	R	S	D	M	Q	S	L	Q	Y	R	T	I	S	G	I	S	L	G	191		
SteB	194	T	Y	S	196																																																
EspA	192	K	192																																																		

[illegible]

4/31

FIG. 3



5/31

FIG. 4A

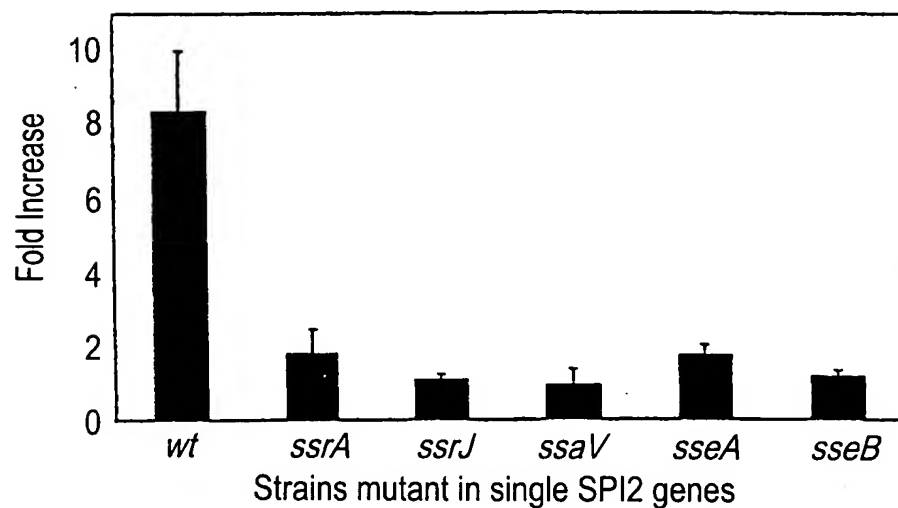
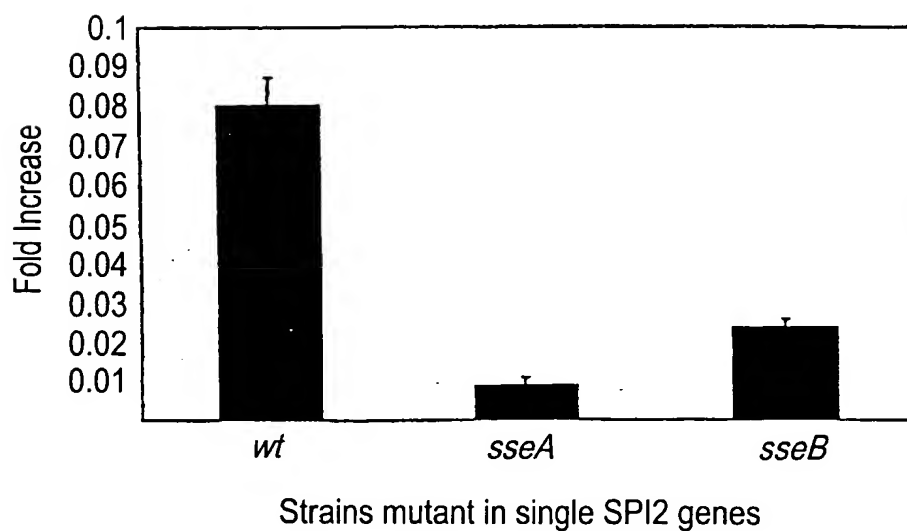
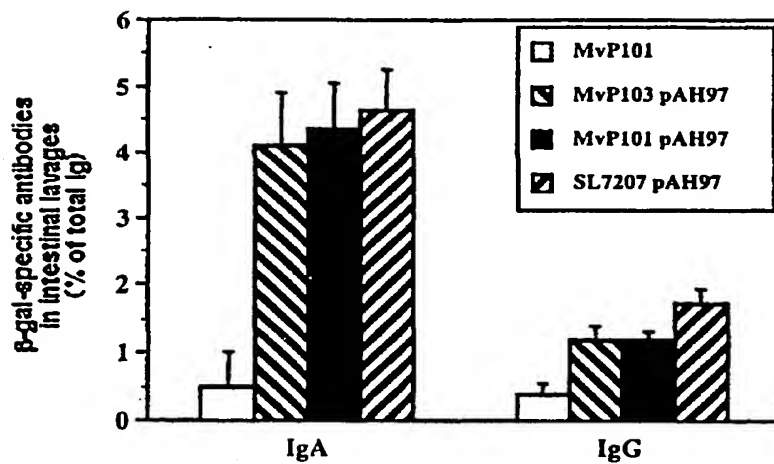


FIG. 4B



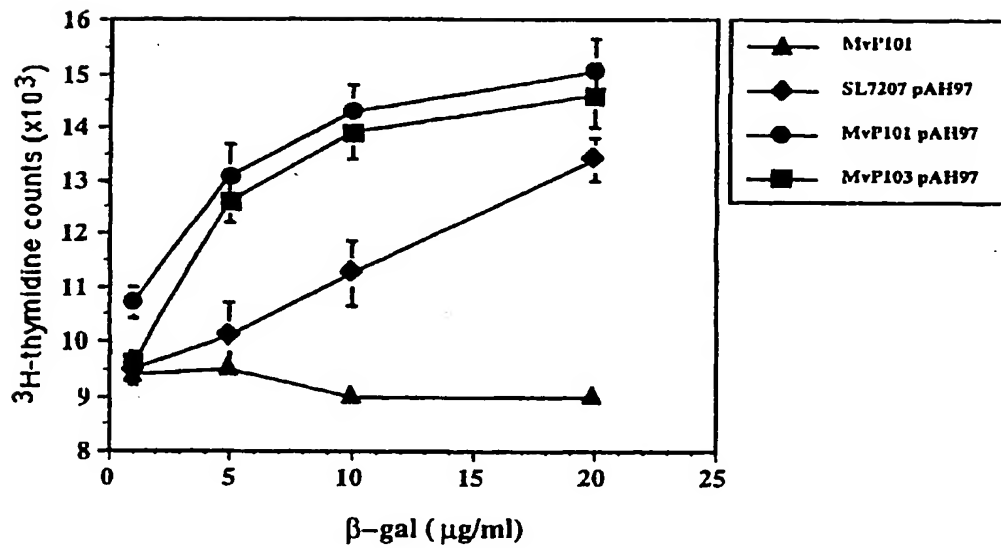
6/31

FIG. 5



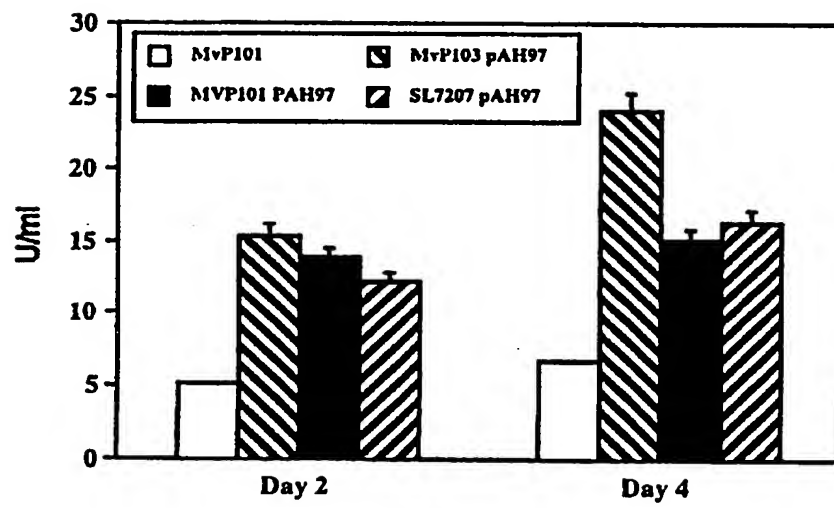
7/31

FIG. 6



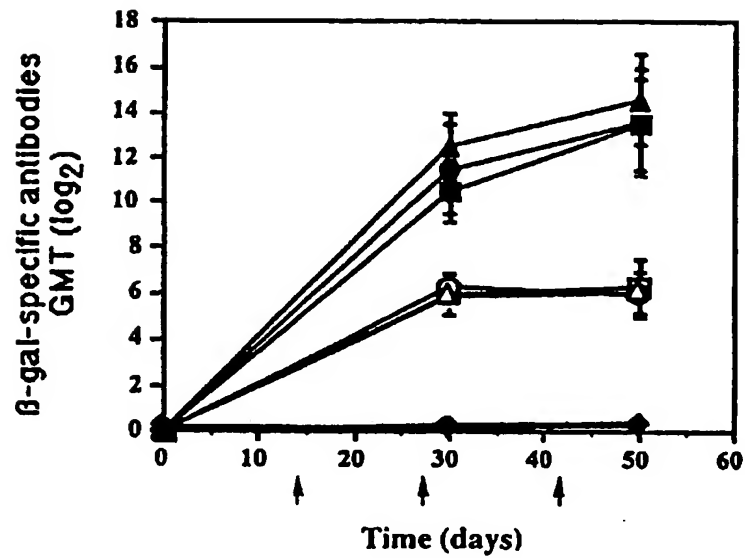
8/31

FIG. 7



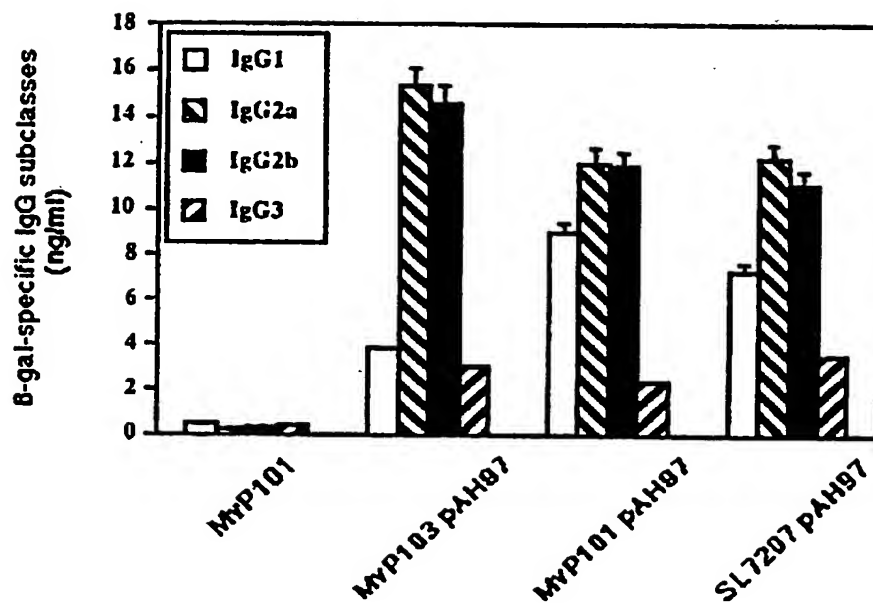
9/31

FIG. 8



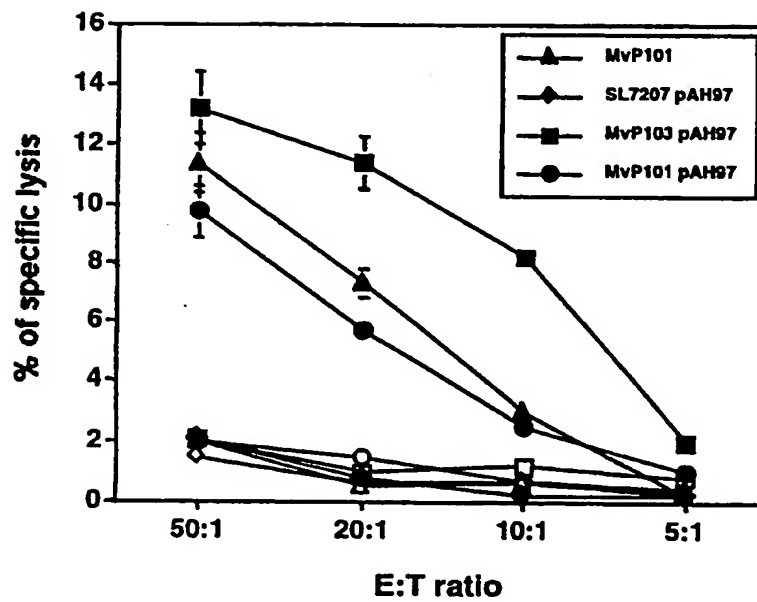
10/31

FIG. 9



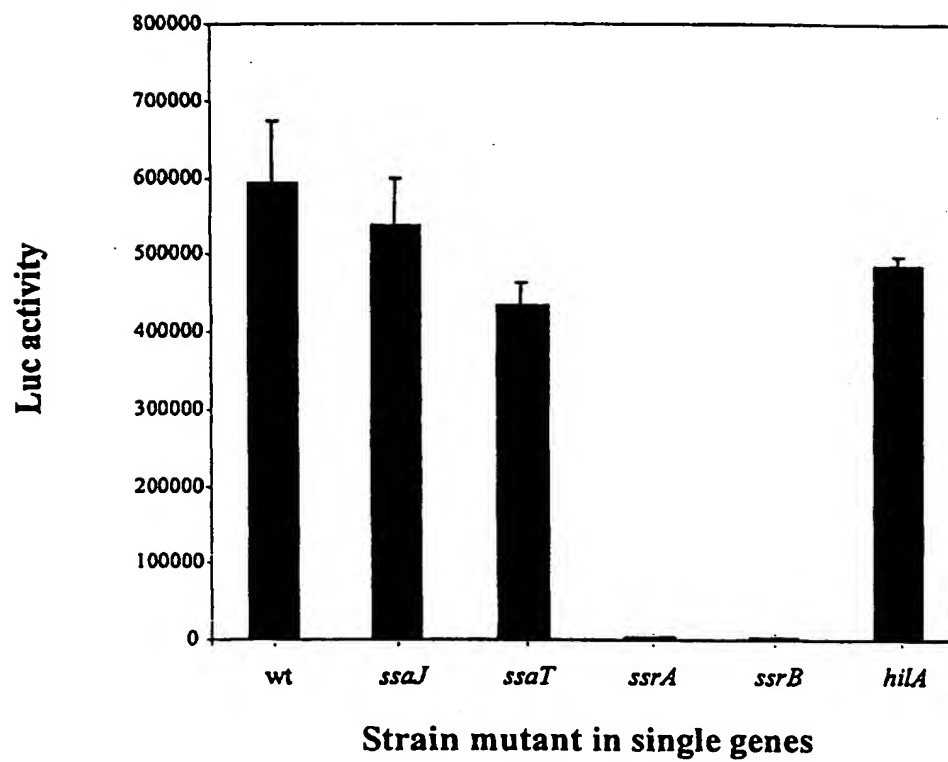
11/31

FIG. 10



12/31

FIG. 11



13/31

Position of mutations in MvP284 and MvP320

FIG. 12A

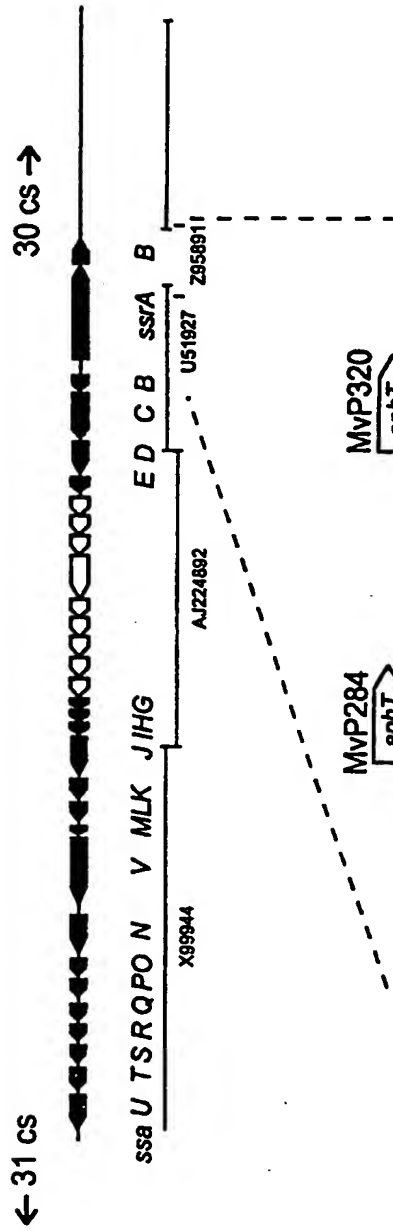
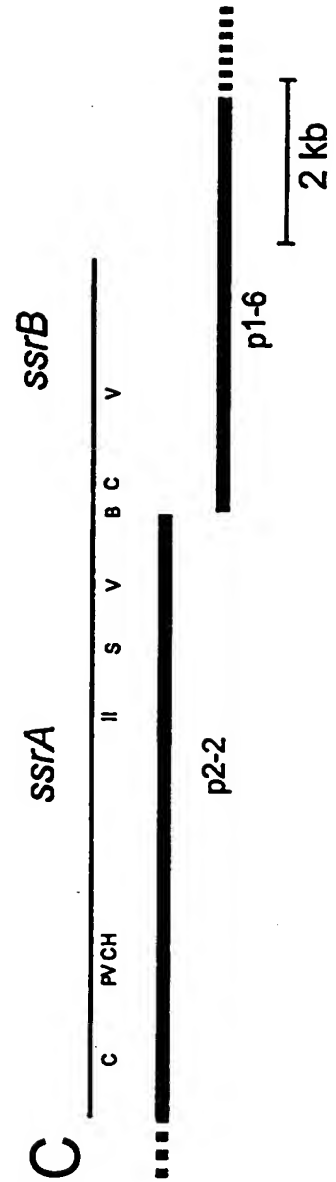


FIG. 12B

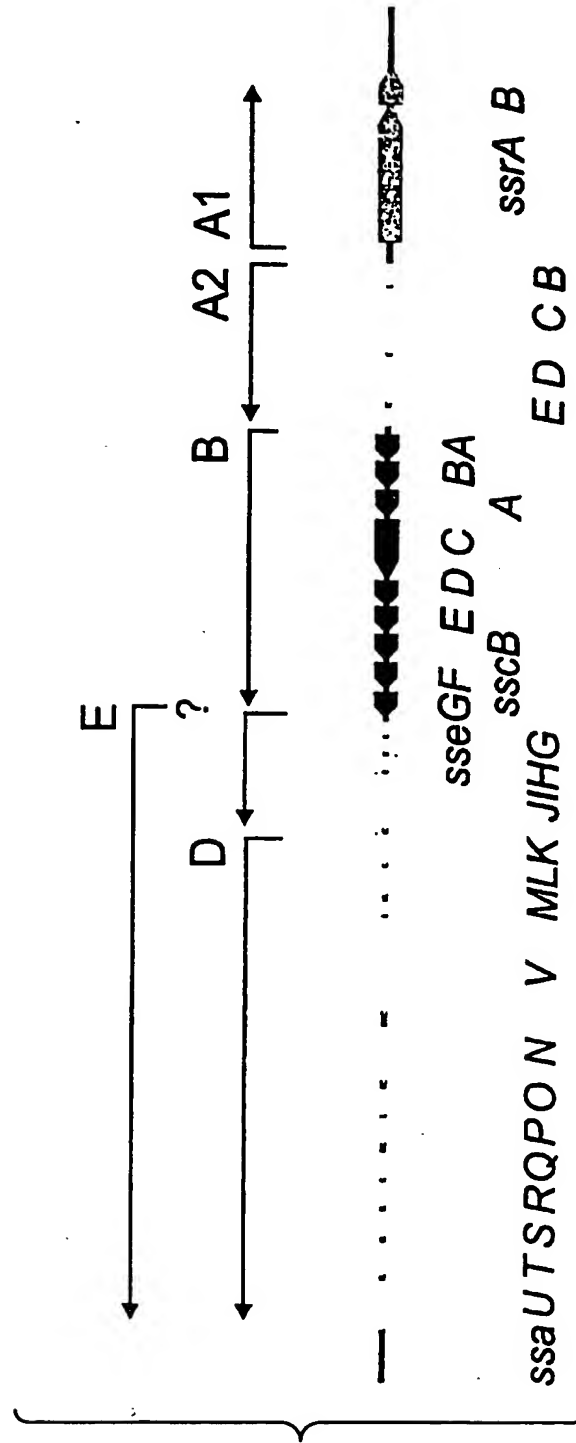


FIG. 12C



14/31

FIG. 13
 Model for the transcriptional units for SP12 virulence genes



15/31

FIG. 14

Principle of Attenuation

Schematic Instruction for the Generation of Different Mutations with Increasing Grade of Attenuation

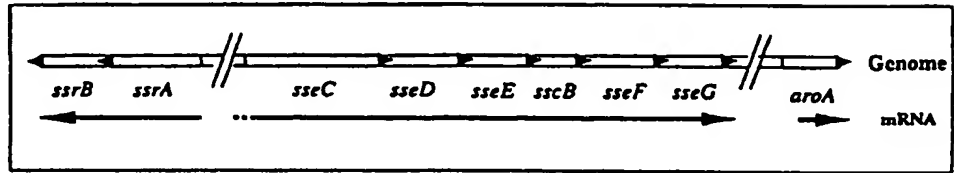


FIG. 14A

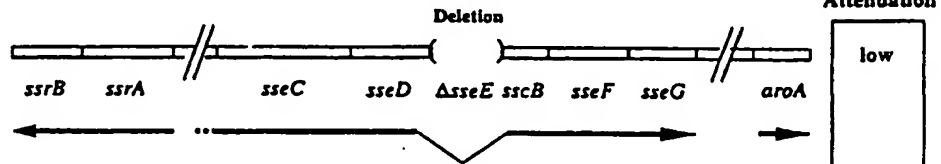


FIG. 14B

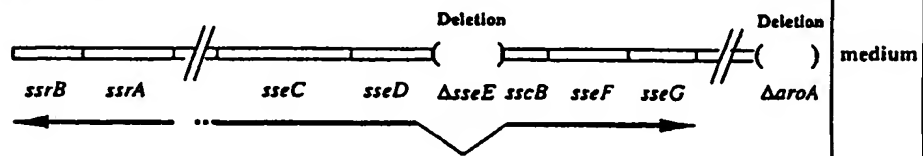


FIG. 14C

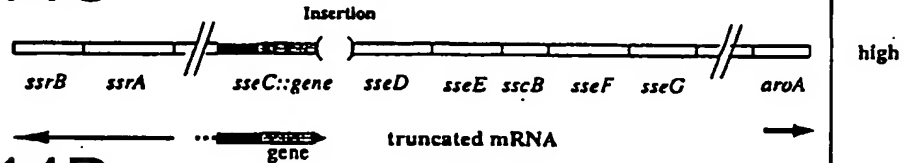
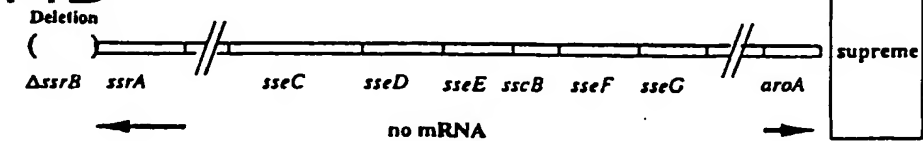


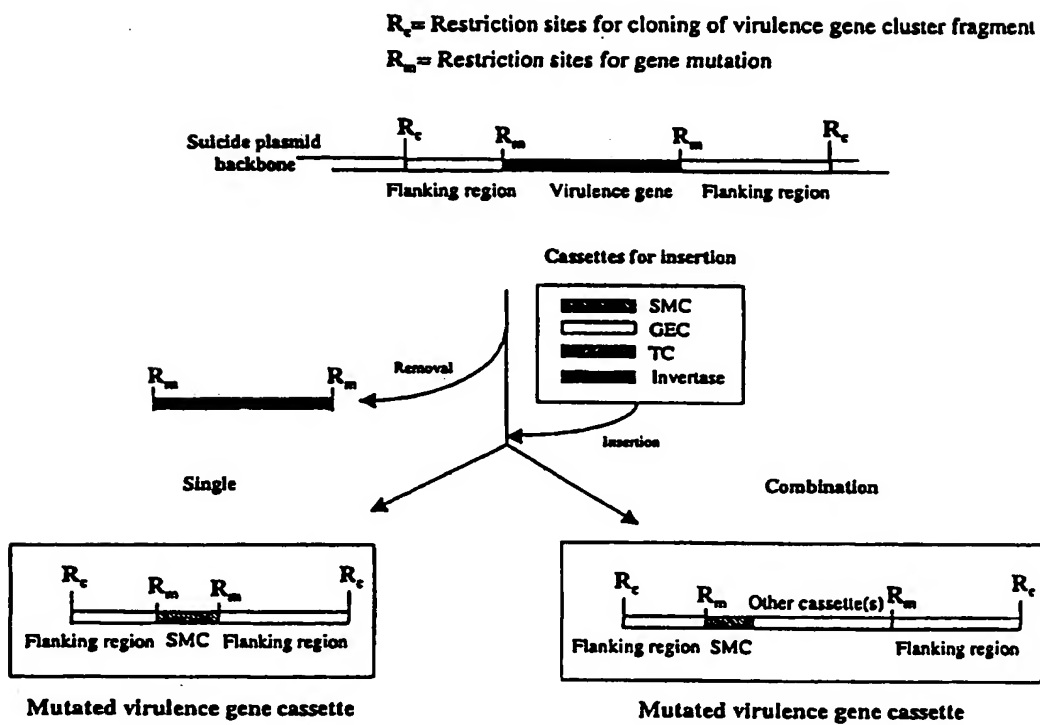
FIG. 14D



16/31

FIG. 15

Principle of insertional mutation

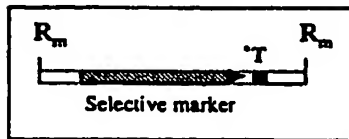


17/31

FIG. 16

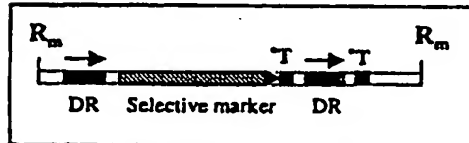
Selective Marker Cassette (SMC)

Permanent selective marker cassette



"T" = Optional transcriptional terminator if polar insertional mutation is required

Revertible selective marker cassette



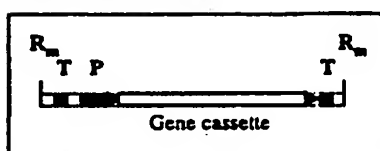
DR = direct repeat

18/31

FIG. 17

Gene Expression Cassette (GEC)

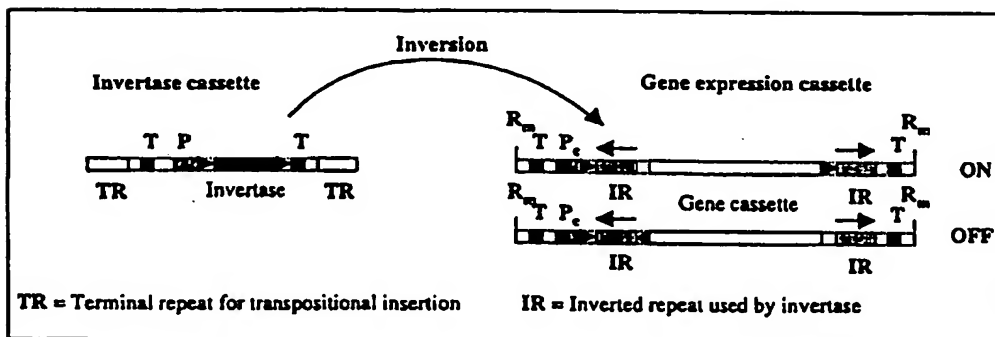
One Phase System



P = Promoter consisting of either a
 - promoter acting constitutively in *Salmonella*
 - a *Salmonella in vivo* inducible promoter or
 - an other promoter

T = Transcriptional terminator

Two Phase System



Gene cassette:



Single gene expression unit

or

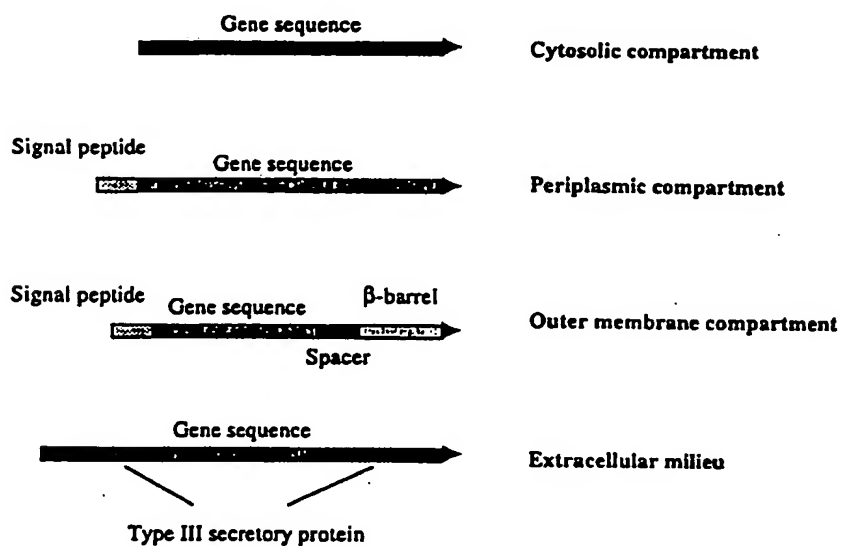


Concatemeric gene expression units

19/31

FIG. 18

Structural requirements of the gene expression unit for the delivery of heterologous antigens into the various *Salmonella* compartments



20/31

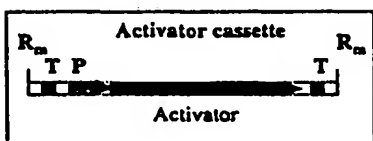
FIG. 19

Transactivator Cassette (TC)

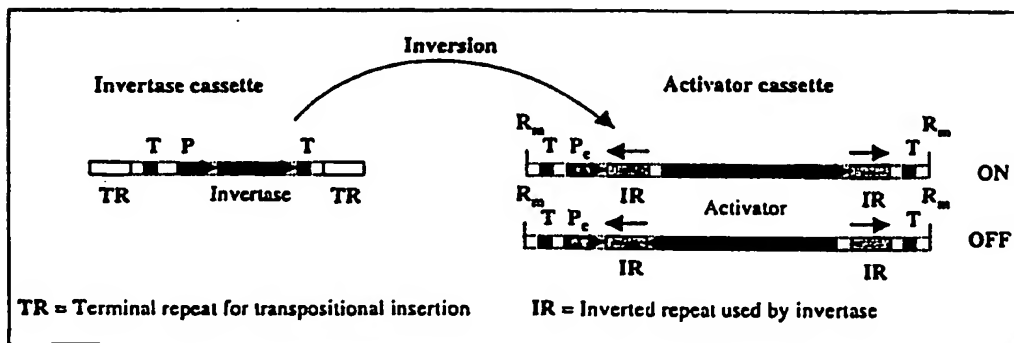
P = Promoter consisting of either a
 - promoter acting constitutively in *Salmonella*
 - a *Salmonella* *in vivo* inducible promoter or
 - an other promoter

P_c = Constitutive promoter

One Phase System



Two Phase System

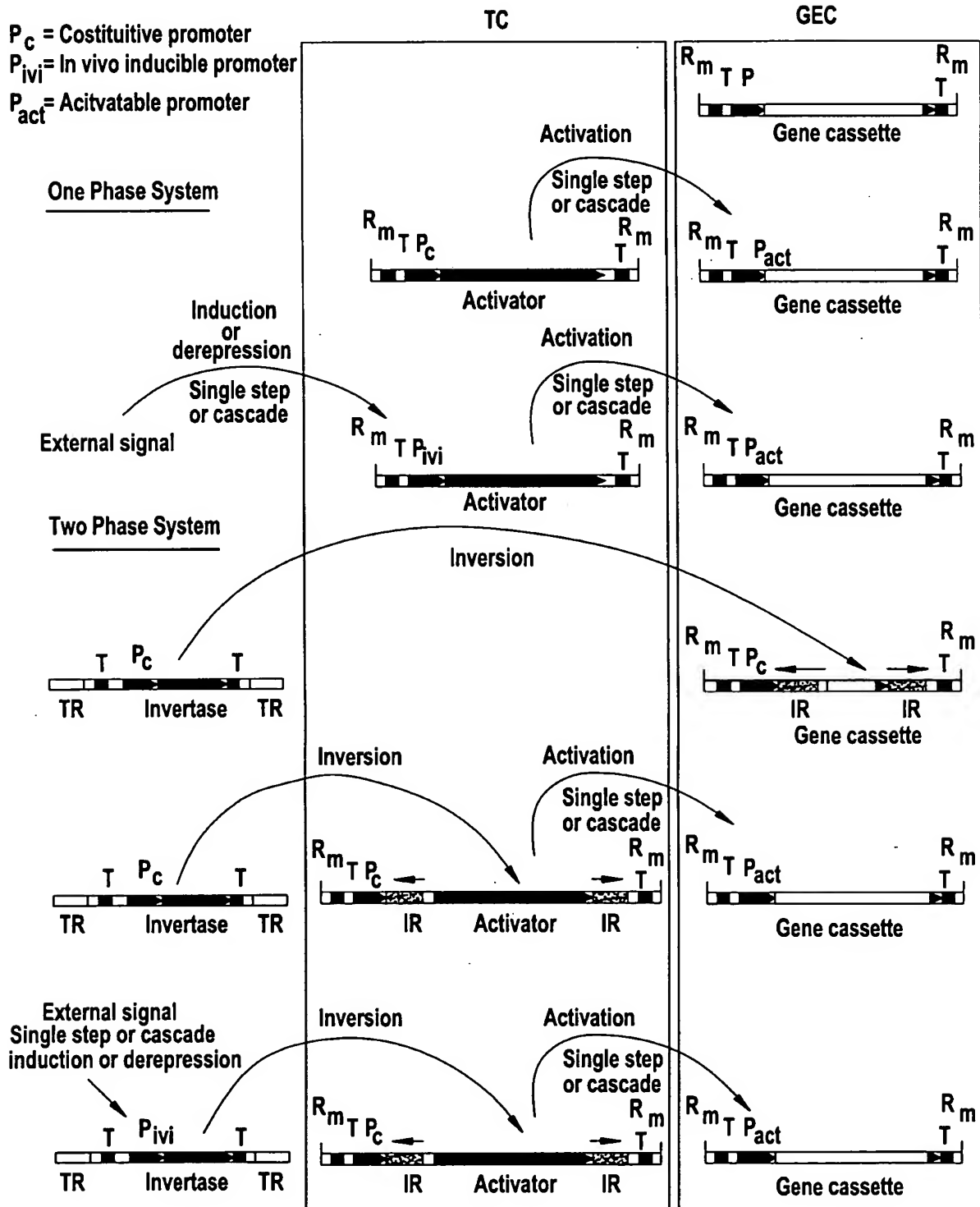


21/31 FIG. 20

P = Promoter consisting of either a
 - promoter acting constitutively in *Salmonella*
 - a *Salmonella in vivo* inducible promoter or
 - an other promoter

Modes of Gene Expression

P_c = Constitutive promoter
 P_{ivi} = In vivo inducible promoter
 P_{act} = Activatable promoter



22/31

FIG. 21A

CTGCAGTTGTCCGGTTATTGCTCGTCAAGCGAACAGATGCAAAAGGTGAGAGCGACTCTCGAATCATGGGGGGTCATGTA
TCGGGATGGTGTAACTCTGTGATGACTTATTGGTACGAGAAGTGCAGGATGTTTGTATAAAATGGGTTACCCGCATGCTG
AAGTATCCAGCGAAGGGCCGGGAGCGTGTAACTCATGATGATATACAAATGGATCAGCAATGGCGCAAGGTTCAACCA
TTACTTGCAGATATTCCCGGGTTATTGCACTGGCAGATTAGTCACTCTCATCAGTCTCAGGGGGATGATATTATTTCTGC
GATAATAGAGAACGGTTTTAGTGGGGCTTGTCAATGTTAGCCCAATGCGGCGCTCTTTTGTATCAGTGGTGTACTGGATG
AATCTCATCAACGCATTTTGTCAAGAAACGTTAGCAGCATTAAAGAAAAAGGATCCCGCTCTTTCTTTAATTTATCAGGAT
ATTGCGCCTTCCCATGATGAAAGCAAGTATCTGCTGCGCCAGTGGCTGGCTTTGTACAGAGTCGCCATGGTAATTACTT
ATTACTGACGAATAAAGAGCGTTTACGTGTAGGGCATTGTACCCTATGGGGGAGAAATTGTCCATCTGAGTGCCGATG
TGTTAACGATTAACATTATGATACCTTTGATTAACTATCCATTAGATTTTAAGTGAGTGAGAAATGACAACCTTTGACCCG
GTTAGAAGATTTGCTGCTTATTGCGGTGAAGAGGCCAAAGGCATAATTTTACAATTAAGGGCTGCCGGAAACAGTTAG
AAGAGAACAACGGCAAGTTACAGGATCCGCGACCAATATCAGCAAAACACCTTATTGCTTGAAGCGATCGAGCAGGCCGAA
AATATCATCAACATTATTTATTATCGTTACCATAACAGCGCACTTGTAGTGAGTGAGCAAGAGTAAAGTAAAAATATCTT
AGAGCCTATCCACCAGGCGTTAATTGGCGCAGCCAGTTTGGACACGGATAGCGCGCAAAACCCGACGCTACACGTAGT
ACGTGAGGTTTGACTCGCTACGCTCGCCCTTCGGGCGCGCTAGCGGCGTTCAAAACGCTAACGCGTTTGGCGAGCAC
TGCCAGGTTTCAAAATGGCAAGTAAATAGCCTAATGGGATAGGCTCTTAGTTAGCACGTTAATTATCTATCTGTATAT
GGAGGGGAATGATGATAAAGAAAAAGGCTGCGTTTATGTAATATCGTGATTTAGAGCAAGTTACATGACAGTAAATCAG
TGTCTTAAAAATTTACCAAATCCGGGCTAAGGTGAGTCAACAGCTTGTGAAAGGGCAGAGAGCCCCAAAAATAGCAG
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AAAACAAAAGGTAAAGCATAATGTCTTCAGGAAACATCTTATGGGGAAGTCAAAACCCCTATTGTGTTTAAAAATAGCTT
CGGCGTCAGCAACGCTGATACCGGGAGCCAGGATGACTTATCCAGCAAAATCCGTTTGGCGAAGGGTATGGTGTGTTGCT
TTATCTCCTTATGGTTATTGAGGCTATCGCAATAATAATTTATGAAGTCCAGAAGACGCTGAACGTGCCAGAAAT
ACCCAGGAAAAGTCAAAATGAGATGAGATGAGGTGATTGCTAAAGCAGCCAAAGGGGATGCTAAACCAAAAGAGGAGGTGCC
TGAGGATGTAATTAATACATGCGTGATAATGGTATTCTCATCGATGGTATGACCATTGATGATTATATGGCTAAATATG
GCGATCATGGGAAGCTGGATAAAGGTGGCTACAGGCGATCAAAGCGGCTTGGATAATGACGCCAACCGGAATACCGAT
CTTATGAGTCAGGGGCGAGATAACAATCAAAAAATGTCTCAGGAGCTTAACGCTGTCTTACCCTACGACAGGGCTTAT
CAGTAAGTGGGGGAAATTTCCAGTATGATAGCGCAGAAAACGTAAGTCTATGAAAAAAGACCCGACCTACACAGGCA
TGACACGATGCGGTTTTTCGGCGTGGCGGCTCGCTGCGTATGTTGTTGGATGACGATGTTACACAGCCGCTTAATACTC
TGTATCGCTATGCCACGACGCTTATGGAGGTAAGAATTCGCGGCGCAGCGCGACTTTTTCAATTGCTGACGATATAT
GATGCTGTGCTATTGACTACTGTTTCGGTTAGGGGAATGCTGCCAGGCTCAAAACATTGGGGGGAAGCGATATACGC
TTATGGACGCGCGGCACAAATTAAGATTGATGCGCGCGAGGCGCCATGGGCGCAGCGGAATGCTATCTCGCGTGTGATA
ACGCTGTTTATGCAATCAAGCGTTAAAGGCCGTGGTGGTATTTTGGCGGAGGTGAGTGAACATCAAAATTTCCGACAG
CGTGACAGAAAGATGTTACAGCAACTTTCTGACAGGAGCTAAAAATGAATCGAATTCACAGTAATAGCGACAGCGCCGCA
GGAGTAACCGCCTTAACACATCATCACTTAAGCAATGTCAAGTTGCGTTTCTCGGGTTGCTGGGAAAGCGCCAGCATCG
TGTGAATTTACTTTTGGCGATGGCAACGCGCGTGTCTGCTATCCGGGAAATAGTCTTCAGGAGGCAAGCAATGCGT
TGAAGCAACTGCTTGTATGCGTACCCGGAATCATAAGCGTCCATCATTGCTGACTTTTTGCAGACCAATCCCGCGGTT
TTATCAATGATGATGACGTCATTAATACTCAACGCTTTTGGTAATAACGCTCAATCGTTATGCCAACAGCTTGAGCGGGC
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ATAAAGCGCGTAAAGCGGGTATTTTGGCGCTATTTTGAAGTGGATTACCGGCATATTTGAAACCGGTGATTGGCGCCTTA
AAAGTTGTGAAGGTTTTCTGTCCGGAATCCCGCAGAAATGGCTAGCGGCGTAGCTTATATGGCCGAGGTTGTGCAGG
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GTAAGATTCAATTTGGTTGTGAAGCCGTGCGCTGGCACTGGATGTTTTCCAGATTGGCCGTGCTTTTATGGCGACGAGA
GTTTTATCTGGCGCAGCTGCAAAAGTGCTTGACTCCGGTTTTGGCGAGGAAGTGGTTGAGCGTATGGTAGGTGCAGGGGA
AGCAGAAATAGAGGAGTTGGCTGAAAAGTTTGGCGAAGAGTGAGCGAAAGTTTTTCCAAACATTTGAGCCGCTTGAAC
GTGAAATGGCTATGGCGAATGAGATGGCAGAGGAGGCTGCCGAGTTTTCTCGTAACGTAGAAAAATAATATGACGCGAAGC
CGGGGAAAAAGCTTTACGAAAGAGGGGTTGAAAGCCATGGCAAAAGAGCGGCAAAAGAGCCCTGGAAAAATGTGTGCA
AGAAGGTGAAAGTTCTGTAAAAAAATCCGTAATAAAGTTCTCTTCAATATGTTCAAAAAATCTGTATGCTTAC
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AACAGAAAAACAGAAAAAGATAGAACAAAAACGCTTAGAGGAGCTTTATAAGGGGACGGGTGCGCGCTTAGAGATGTAT
TAGATACCATTGATCACTATAGTAGCGTTACGCGAGAAATAGCTGGCTATCGCGCTTAATCTGAGGATAAAAAATATGGAA
GCGAGTAACGTAGCACTGGTATTACCAGCGCCTTCTTGTAAACACCTTCTTCACTCCATCTCCCTCCGGGGAGGGAAAT
GGGTACTGAATCAATGCTTCTGTTATTGATGATATCTGGATGAAGCTAATGGAGCTTGCCAAAAAGCTGCGCGATATCA
TGCGCAGCTATAAGCTAGAAAAACAACGGCTGGCCTGGGAAGTCAAGTCAATGTTTTACAGACGCAATGAAAACAATT
GATGAAGCGTTTACAGCATCAATGATTACTGCGGGTGGCGCAATGTTGTGCGGGTACTGACGATAGGATTAGGGGCGGT

23/31

FIG. 21A-1

AGGCGGGGAAACCGGTCTTATAGCGGGTCAAGCCGTAGGCCACACAGCTGGGGGCGTCATGGGCCTGGGGGCTGGTGTAG
CGCAACGTCAAAGTGATCAAGATAAAGCGATTGCGGACCTGCAACAAAATGGGGCCCAATCTTATAATAAATCCCTGACG
GAAATTATGGAGAAAGCAACTGAAATTATGCAGCAAATCATCGGCGTGGGGTCTGCACTGGTCACGGTTCTTGCTGAAAT
ACTCCGGGCAATTAACGAGGTAAACATGGTGCAAGAAATAGAGCAATGGTTACGTCGGCATCAGGTGTTTACTGAGCCTGC
ATATTTAGGGGAGACCGCCATATTACTTGGGCAGCAGTTTATATTATCGCCTTACCTGGTGATCTATCGTATTGAGGC
AAGAAATGATTATTTGTGAGTTCAGGCGCCTGACGCCGGGCAACCTCGACCACAGCAATTGTTTCACTTACTGGGACTT
TTACGCGGGATATTGTGCATCACC CGCAGTTAATCATGTTTAAAGATGTTGATAATCACCAGCCTTCTGGATGAAAAAA
AGCCATGCTACGCAGGAAATATTGCGCATCCTGACAGTAATGGGAGCGACCTTTACACAGCTTGATGGCGATAACTGGA
CAGTTTTATCCGCGAGCATCTTATCCAGCGACGTTTTTAAATGACCTTCTGACGTAATCATTATCAGTGAAAAATAA
CAATCAATAGGTATGATGATGAAAGAAGATCAGAAAAATAAAATACCCGAAGACATTCTGAAACAGCTATTATCCGTTGA
TCCGGAACCGGTTTATGCCAGTGGTTACGCTCATGGCAGGAGGGGATTATTCGCGCGCGTAATCGATTTTAGTTGGC
TGGTGATGGCCAGCCATGGAGTTGGCGTGCCATATTGCATTGGCTGGCACCTGGATGATGCTTAAAGAATACACGACG
GCCATTAATTTCTATGGACATGCCCTTGATGCTGGATGCCAGCCATCCAGAACCGGTTTTACCAACGGGCGCTGCTCTCAA
AATGATGGGGGAACCCGGTTGGCGAGAGAGGCTTTTCAAACCGCAATCAAGATGAGTTATGCGGATGCCTCATGGAGTG
AGATTCGCCAGAAATGCGCAAAATAATGGTTGATACTCTTATGCTTAAATAACAGAACGAAATATGAAAAATCATATTCCG
TCAGCGCAAGTAATATAGTCGATGGTAATAGTCCTCTTCCGATATACAAGCGAAGGAGGTATCGTTTCTCCCTGGA
AATTCAGCGCCTGGCACCCCGCAGCCCTGTGCTGCTTACGCTGAACAAATAAGGAGCAGAGGGATTATGCGATAC
ATTTTATGCAATACACTATTCTGTGCGCTGGGTGCGACAGTCGTGTTGGGTTATCGGTTGCTGCAGCGGTAATTTCTGGC
GGGCGAGGATTACCCATTGCTATTCTTGGGGGGCGCGCTCGTGATTGCTATTGGGGATGCTTGCTGTGCGGTATCATAA
TTATCAATCGATATGTCAGCAAAAGGAGCCATTACAAACCGCCAGTGATAGCOTTGCTCTTGTTGGTCAGTGCGCTGGCCT
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CTGTTGATGAACTTCATGCCGATCCAGTGTTTATGGCGGAACAAATGGCAGCGCTCTGTCAATCTGCTACTACACCT
GCACCTGCATTAATGGACAGTTCTGATCATACATCTCGGGGAGAACCATGAACCTGTTAGCCCAAATGCTCAGGTAGGA
GGGCAACGTCCTGTTAACGCGCCTGAGGAATCACCTCCATGTCTTCATTGCCACATCCGGAACCAATATGGAGAGTGG
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TTTTTAGTTGGCAAACGGTTATTTTGGGCGGACAGATTTTATGCTGTTCCGCTGGAATAGCATTAAACAGTGCTAAGTGGT
GGAGGCGCGCCGCTCGTAGCCCTGGCAGGGATTGGCTTGCTATGTCATCGCGGATGTCGCTGCTTATCTACCATCA
TAAACATCATTTGCTATGGCTCAGCAGATATAGGCAATGCCGTTTTTATATTGCTAATTGTTTCGCCAATCAACGCA
AAAGTATGGCGATTGCTAAAGCCGCTCTCCCTGGGCGGTAGATTAGCCTTAACCGCGACGGTAATGACTCATTACTAGG
AGTGGTAGTTTGGGACTACAGCCTCATTTATAGAGCGTCTTAATGATATTACCTATGGACTAATGAGTTTACTCGCTT
CGGTATGGATGGGATGGCAATGACCGGTATGCAGGTGAGCAGCCATTATATCGTTTGCTGGCTCAGGTAACGCCAGAAC
AACGTGCGCCGGAGTAATCGTTTTTCAGGTATATACCGGATGTTTATTGCTTTCTAAATTTTGCTATGTTGCGAGTATCCT
TACGATGTATTTATTTAAGGAAAAGCATTATGGATATTGCACAATTAGTGATATGCTCTCCCATGCGCACCAGGC
AGGCCAGGCCATTATGACAAAATGAATGGTAATGATTGCTCAACCCAGAATCGATGATTAAAGCGCAATTTGCTTAC
AGCAGTATTCTACATTATTAATTACGAAAGTTCACTGATCAAAATGATCAAGGATATGCTTAGTGGAATCATTGCTAAA
ATCTGAAGTTATTAGCGACGATGTTGACGCGTTGCTGCTGGAATCATGTTTGGCGGCGTTAACCATAGCCTGATTTCCT
AGGTACATGCGATGTTACAGCGCTAACGCTTATTGTTCCGGATAAAAAATTACAGTTGGTATGCTGCGCATTATTGTTG
GCGGTTTTAAATGAGCCGCTAAAAGCCGCGAAAAATTTATCGGATATAGATTGCGCAGAGGCTATGGCGCTGCGTCTGTT
ATTTCTGACCAAAATGAGGGGTTTGAATTTGAATTTCTGATATGAGCGTAGTGCTGTAAGCACTCAATCTTATGT
AAAGTCTCTGTCAGAACCGAGCCAGGAGCAAAATTAATTTTTTGAACAATTGCTGAAAGATGAAGCATCCACCAGTAACG
CCAGTGCTTTATTACCGCAGGTTATGTTGACCAGACAAATGGATTATATGCAAGTTAACGGTAGGCGTCGATTATCTTGCC
AGAATATCAGGCGCAGCATCGCAAGCGCTTAATAAGCTGGATAACATGGCATGAAGGTTTATCGTATAGTATTCTTACT
GTCCTTACGTTCTTTCTTACGGCATGTGATGTGGATCTTTATCGCTCATGCGCAGAAGATGAAGCGAATCAAATGCTGGC
ATTACTTATGCAGCATCATATTGATGCGGAAAAAAACAGGAAGAGGATGGTGTAACCTTACGTGTCGAGCAGTCGCAOT
TTATTAATGCGGTTGAGCTACTTAGACTTAACGGTTATCCGCATAGGCGAGTTTACAACGGCGGATAAGATGTTCCGGCT
AATCAGTTAGTGGTATCACCCAGGAAGAAGCAGCAGAAGATAATTTTAAAGAAACAAAGAAATGAAGGAATGCTGAG
TCAGATGGAGGGCGTGAATTAATGCAAAAGTGACCATTTGCGCTACCGACTATGATGAGGGAAGTAACGCTTCTCCGAGCT
CAGTTGCGGTATTTATAAAATATTACCTCAGGTCAATATGGAGGCTTTTCGGGTAAAAATTAAGATTAAATAGAGATG
TCAATCCCTGGGTTGCAATACAGTAAGATTAGTATCTTGATGCAGCCTGCTGAATTC

24/31

FIG. 21B

AGCATTGACATAAAAACTTACAATTTGAAAAATTATTTATTAATAAACTGTTACGATGTTTTTACATCGCCATCTTATT
AAAAAGTAATTGTAGTCACTCGACTGGGTTATATATGAAGAAAATTATCTTCTAATGATAACACCATCGATTAACTCTTCT
GATGAACTATATGTACTGCGATAGTGATCAAGTGCCAAAGATTTTGCAACAGGCAACTGGAGGGAAGCATTATGAATTT
GCTCAATCTCAAGAATACGCTGCAACATCTTTAGTAATCAGGCTAACTTTTTTATTTTATTAACAACAATAATTATTT
GGCTGCTATCTGTGCTTACCGCAGCTTATATATCAATGGTTGAGAAACGGCAGCATATAATAGAGGATTTATCCGTTCTA
TCCGAGATGAATATTGTACTAAGCAATCAACGGTTTGGAAGAAGCTGAACGCTGACGCTAAAAATTTAATGTATCAATGCTC
ATTAGCGACTGAGATTCATCATAACGATATTTTCCCTGAGGTGAGCCGGCATCTATCTGTGCGTCTTCAAATTGACACGC
CGACGCTAAACGGAGAGAAGCACCGTCTCTTTCTGCACTCTCTGATATCGATGAAAAAGCTTTCTGTCGCGATAGTTTT
ATTCTTAATCATAAAAAATGAGATTTGTTTATTTATCTACTGATAACCCCTTCAAGTTATTTCAACTCTACAGCCTTTAACGCG
AAAAAGCTTTCTTTTATACCAACCCATGCGGGTTTTACTGGAGTGAACCAAGATACATAAACCGCAAGGATGGCAGC
CTTCCGTTGCGGTTGCGGATCAGCAAGGCGTATTTTTGAGGTGACGGTTAACTTCCCGATCTCATTACTAAGAGCCAC
CTGCCATTAGATGATAGTATTGCGATATGGCTGGATCAAAACAACCACTTATTGCGGTTTTCTATACATCCCGCAAAAAAT
ACGTACACAGTTAGAAAAATGTAACGCTGCTATGATGGATGGCAGCAAAATCCCGATTCTGATATTACGCACAACCTTGC
ATGGCCCCGGATGGAGTCTGGTTACGCTGTACCCATACGGTAACTACATAATCGCATCTTAAAAATTTATCTTCAACAA
ATCCCCCTTTACATTAACAGCATTGGTGTGATGACGTCGGCTTTTTGCTGGTTACTACATCGCTCACTGGCCAAACCGTT
ATGGCGTTTTGTGCGATGTCATTAAATAAACCGCAACTGCACCGCTGAGCACACGTTTACCAGCAACAGCTGGATGAAT
TAGATAGTATTGCGGGTGCTTTTAAACCACTGCTTGATCTCTCAAGTCCAATACGACAATCTGGAAAAAAGAGTCGCA
GAGCGCACCCAGGCGCTAAATGAAGCAAAAAACCGGCTGAGCGAGCTAACAAACGTAAAGCACTTCTCTTACGGTAAAT
AAGTCATGAGTTACGTACTCCGATGAATGGCGTACTCGGTGCAATTGAATTATTACAAACCAACCCCTTTAAACATAGAGC
AACAAAGGATTAGCTGATACCGCCAGAAATGTACACTGTCTTTGTTAGCTATTATTAATAATCTGCTGGATTTTTACGCG
ATCGAGTCTGGTCATTTACATTACATATGGAAGAAACAGCGTTACTGCGGTTACTGGACCAGGCAATGCAAAACCATCCA
GGGGCCAGCGCAAGCAAAAACTGTCACTTACGTACTTTGTGCGGTCAACATGTCCCTCTCTATTTTACATACCGACAGTA
TCCGTTTACGGCAAAATTTGGTTAATTTACTCGGGAACCGGTTAAATTTACCGAAACCGGAGGGATACGCTCTGACGGTC
AAGCGCTGAGAGCAAAATTAATTTCTGGTTAGCGATAGGATTAAGGGATTGAAATACAGCAGCAGTCTCAAACTCTT
TACTGCTTTTTATCAAGCAGACCAAAATTCGCAAGGTACAGGAATTGGACTGACTATTGCGTCAAGCCTGGCTAAAAATGA
TGGGCGGTAACTCTGACATAAAAGTGTCCCGGGGTTGGAACCTGTGTCTCGCTAGTATTACCTTACAGAATACCCAG
CCGCTCAACCAATTAAGGGGACGCTGTACGCGCGGTTCTGCTGCTCGGCAACTGGCTTGTGGGGAATACGCGGTGA
ACCAACCCAGGCAAAATGCGCTTCTCAACGAGAGCTTTGTATTTCTCGGAAAACTCTACGACCTGGCGCAACAGT
TAATATTGTGACACCAAAATATGCCAGTAATAAATTTGTTTACCACCTGGCAGTTGCAAGTCTTTTGGTTGATGAT
GCCGATATTAATCGGGATATCATCGGCAAAATGCTTGTGAGCTGGGCAACACGTCATATTGCGGCCAGTAGTAACGA
GGCTCTGACTTTATCAACAGCAGCGATTGATTTAGTACTGATTGACATTAGAATGCCAGAAATAGATGGTATTGAAT
GTGTACGATTATGGCATGATGAGCCGAATAATTTAGATCTGACTGCATGTTTGTGGCACTATCCGCTAGCGTAGCGACA
GAAGATATTATCGTTGTAAAAAAATGGGATTCACTTACATTACATAAAACCAAGTGACATTGGCTACCTTAGCTCGCTA
CATCAGTATTGCGCGAGAATACCACTTTTACGAAATATAGAGCTACAGGAGCAGGATCCGAGTCTGCTCAGCGCTAC
TGGCGACAGATGATATGGTCATTAAATAGCAAGATTTTCCAATCACTGGACCTCTGCTGGCTGATATTGAAAAATGCCGTA
TCGGCTGGAGAAAAATCGATCAGTTAATTACACATTAAGGGCTGTTTAGGTCAAAATAGGGCAGACTGAATTGGTATG
CTATGTCTAGACATTGAGAAATCGCGTAAAAATGGGGAAATCATCGCGCTGGAGGAACTAACCGACTTACGCCAGAAAA
TACGTATGATCTTCAAAAACTACACCAATTACTTAATATTATCTTAATTTTCGCGAGGGCAGCAAAATGAAAGAATATAAG
ATCTTATTAGTAGACGATCATGAAATCATCATTAAACGGCATTATGAATGCCCTTATTACCCTGGCCTCATTTTAAATTTGT
AGAGCATGTTAAAAATGGTCTTGAGGTTTATAATGCCGTGTTGTGCATACGAGCCTGACATACTTATCCTTGATCTTAGTC
TACCTGGCATCAATGGCCTGGATATCATTCTCAATTACATCAGCGTTGGCCAGCAATGAATATTCTGGTTTACACAGCA
TACCAACAAGAGTATATGACCATTAAAACTTTAGCCGAGGTTGCTAATGGCTATGTTTTAAAAAGCAGTAGTCAGCAAGT
TCTGTTAGCGGATTGCAAAACAGTAGCAGTAACCAAGCGTTACATTGACCCAAACGTTGAATCGGGGAAGCTATCTGGCTG
AATTAACAGCTGACACGACCAATCATCAACTGCTTACTTTGCGCGAGCGTCAGGTTCTTAACTTATTGACGAGGGGTAT
ACCAATCATGGGATCAGCGAAAGCTACATATCAGTATAAAACCGTCGAAACACACCGGATGAATATGATGAGAAAGCT
ACAGGTTTCATAAAGTGACAGAGTTACTTAACTGTGCCGAAGAATGAGGTTAATAGAGTATTAACAGGGGCGTCCGATG
GTATTAAAGCATTTGGTCATATTTGATGAGCCTTACGCCACGAGTATTGCTCATCATCGACAAAAATCATACGGATGCC
TGGTATGCCGACCATTTATCACTACCTTAGTCTTCAATTGATCATGATATAGTAGAATCCCCCTTATTAACGGGCTTTA
CCATGTGCTATTCTATCGGCGAATTTGCCAGACTATGCGGTATCAATGCCGCCACGCTAAGGGCATGGCAGCGACGCTAT

25/31

FIG. 22A

sseA

ATGATGATAAAGAAAAAGGCTCGCTTTAGTGAATATCGTGATTTAGAGCAAAGTTACATGCAGCTAAATCACTGTCTTAA
AAAATTTACCAAATCCGGGCTAAGGTGAGTCAACAGCTTGCTGAAAGGGCAGAGAGCCCCAAAAATAGCAGAGAGACAG
AGAGTATTCTTCATAACCTATTTCCACAAGGCGTTGCCGGGGTTAACCAGGAGGCCGAGAAGGATTTAAAGAAAAATAGTA
AGTTTGTTTAAACAACCTGAAGTACGACTGAAACAACCTTAATGCTCAAGCCCCGGTGGAGATACCGTCAGGAAAAACAA
AAGGTAA

FIG. 22B

sseB

ATGTCTTCAGGAAACATCTTATGGGAAGTCAAAACCTATTGTGTTTAAAAATAGCTTCGGCGTCAGCAACGCTGATAC
CGGGAGCCAGGATGACTTATCCAGCAAATCCGTTTGCCGAAGGGTATGGTGTGTTGCTTATTCTCTTATGTTTATTC
AGGCTATCGCAAATAATAATTTATTGAAGTCCAGAAGACGCTGAACGTGCCAGAAATACCCAGGAAAAAGTCAAATGAG
ATGGATGAGGTGATTGCTAAAGCAGCCAAAGGGGATGCTAAACCAAAGAGGAGGTGCCCTGAGGATGTAATTAATACAT
GCGTGATAATGGTATTCTCATCGATGGTATGACCATTGATGATTATATGGCTAAATATGGCGATCATGGGAAGCTGGATA
AAGGTGGCCTACAGGCGATCAAAGCGGCTTTGGATAATGACGCCAACCGGAATACCGATCTTATGAGTCAGGGGCAGATA
ACAATTCAAAAAATGTCTCAGGAGCTTAACGCTGTCTTACCCTAAGTACAGGGCTTATCAGTAAGTGGGGGAAATTC
CAGTATGATAGCGCAGAAAACGTACTCATGA

FIG. 22C

sseC

ATGAATCGAATTCACAGTAATAGCGACAGCGCCGAGGAGTAACCGCCTTAACACATCATCACTTAAGCAATGTCTAGTTG
CGTTTCCTCGGTTTCGCTGGGAAAGCGCCAGCATCGTGTGAATCTACTTTTGGCGATGGCAACGCCGCGTGTCTGCTAT
CCGGGAAAAATTAGTCTTCAGGAGGCAAGCAATGCGTTGAAGCAACTGCTTGATGCCGTACCCGGAAATCATAAGCGTCCA
TCATTGCGCTGACTTTTTCAGACCAATCCCGCGGTTTTATCAATGATGATGACGTCATTAATACTCAACGTCTTTGGTAA
TAACGCTCAATCGTTATGCCAACAGCTTGAGCGGGCAACTGAGGTGCAAAATGCATTACGTAATAAGCAGGTAAAGGAGT
ATCAGGAGCAGATCCAGAAAGCGATAGAGCAGGAGGATAAAGCGCGTAAAGCGGGTATTTTGGCGCTATTTTGAAGTGGC
ATTACCGGCATATTTGAAACCGTGATTGGCGCCTTAAAGTTGTGGAAGGTTTTCTGTCCGGAAATCCCGCAGAAATGGC
TAGCGGCGTAGCTTATATGGCCGAGGTTGTGCAGGAATGGTTAAAGCCGGAGCCGAAACGGCAATGATGTGCGGTGCTG
ACCACGATACCTGTACAGGCAATTATTGACGTGACAAGTAAGATTCAATTTGGTTGTGAAGCCGTGCGCTGGCACTGGAT
GTTTTCCAGATTGGCCGTGCTTTTATGGCGACGAGAGGTTTTATCTGGCGCAGCTGCAAAAGTGCTTGACTCCGGTTTTGG
CGAGGAAGTGGTTGAGCGTATGGTAGGTGCAGGGGAAGCAGAAATAGAGGAGTTGGCTGAAAAGTTTGGCGAAGAAGTGA
GCGAAAGTTTTTCCAAACAATTTGAGCCGCTTGAACGTGAAATGGCTATGGCGAATGAGATGCGAGAGGAGGCTGCCGAG
TTTTCTCGTAACGTAGAAAATAATATGACGCGAAGCGCGGAAAAAGCTTTACGAAAGAGGGGGTGAAGCCATGGCAAA
AGAAGCGGCAAAAGAGGCCCTGGAAAAATGTGTGCAAGAAGGTGGAAGTTCTGTGTAATAAAATTCGGTAATAAAGTTC
TCTTCAATATGTTCAAAAAATCCTGTATGCCTTACTGAGGGATTGTTTCAATTAAGGCTTACAGGCTATCAGATGTGCA
ACCGAGGGCGCCAGTCAGATGAATACTGGCATGGTTAACACAGAAAAAGCGAAGATCGAAAAGAAAATAGAGCAATTAAT
AACTCAGCAACGGTTTTCTGGATTTTATAATGCAACAAACAGAAAAACCAGAAAAAGATAGAACAAAAACGCTTAGAGGAGC
TTTATAAGGGGACGGGTGCCGCGCTTAGAGATGTATTAGATACCATTGATCACTATAGTAGCGTTCAGGCGAGAATAGCT
GGCTATCGCGCTTAA

FIG. 22D

sseD

ATGGGTACTGAATCAATGCTTCTGTATTGATGATATCTGGATGAAGCTAATGGAGCTTGCCAAAAAGCTGCGGATAT
CATGCGCAGCTATAACGTAGAAAAACAACGGCTGGCCTGGGAAGTCAAGTCAATGTTTTACAGACGCAATGAAAAACAA
TTGATGAAGCGTTTAGAGCATCAATGATTACTGCGGGTGGCGCAATGTTGTGCGGGTGACTGACGATAGGATTAGGGGCC
GTAGGCGGGGAAACCGGTCTTATAGCGGGTCAAGCCGTAGGCCACACAGCTGGGGGCGTCATGGGCCTGGGGGCTGGTGT
AGCGCAACGTCAAAGTGATCAAGATAAAGCGATTGCCGACCTGCAACAAATGGGGCCCAATCTTATAATAAATCCCTGA
CGGAAATTATGGAGAAAGCAACTGAAATTATGCAGCAATCATCGGCGTGGGGTCTGCTACTGGTCACGOTTCCTTGCTGAA
ATACTCCGGGCATTAAACGAGGTAA

26/31

FIG. 22E

sseE

ATGGTGCAAGAAATAGAGCAATGGTTACGTCGGCATCAGGTGTTTACTGAGCCTGCATATTTAGGGGAGACCGCCATATT
ACTTGGGCAGCAGTTTATATTATCGCCTTACCTGGTGATCTATCGTATTGAGGCAAAAGAAATGATTATTTGTGAGTTCA
GGCGCCTGACGCCCCGGGCAACCTCGACCACAGCAATTGTTTCACTTACTGGGACTTTTACGCGGGATATTTGTGCATCAC
CCGCAGTTAACATGTTTTAAAGATGTTGATAATCACCGACGTTCTGGATGAAAAAAAAGCCATGCTACGCAGGAAATTATT
GCGCATCCTGACAGTAATGGGAGCGACCTTTACACAGCTTGATGGCGATAACTGGACAGTTTATCCGCCGAGCATCTTA
TCCAGCGACGTTTTTAA

FIG. 22F

sseF

ATGAAAATTCATATTCGCTCAGCGGCAAGTAATATAGTCGATGGTAATAGTCCTCCTTCCGATATACAAGCGAAGGAGGT
ATCGTTTCCCTCCCTGAAATTCAGCGCCTGGCACCCCCGAGCCCCCTGTGCTGCTTACGCCTGAACAAATAAGGCAGC
AGAGGGATTATGCGATACATTTTATGCAATACACTATTGCTGCGCTGGGTGCGACAGTCGTGTTTGGGTATCGGTTGCT
GCAGCGGTAATTTCTGGCGGGGAGGATTACCCATTGCTATTCTTGGCGGGGCGCGCTCGTGATTGCTATTGGGGATGC
TTGCTGTGCGTATCATAATTATCAATCGATATGTCAGCAAAAGGAGCCATTACAAACCGCCAGTGATAGCGTTGCTCTTG
TGTCAGTGCCTGGCCTTAAATGTGGGGCAAGTCTTAACTGCGCTAACACCCTTGCTAATTGCTTTCTTTATTAATA
CGTTCAGGAATCGCTATTTCTATGTTGGTTTTACCCCTACAGTTTCCACTGCCCGCGGCTGAAAATATTGCGGCCTCTTT
GGACATGGGGAGTGAATTACCTCCGTTAGCCTGACGGCGATAGGTGCGGTACTGGATTATTGCTTGGCCGCCCCCTCTG
GCGACGATCAGGAAAATCTGTTGATGAACTTCATGCCGATCCAGTGCTGTTATTGGCGGAACAAATGGCAGCGCTCTGT
CAATCTGCTACTACACCTGCACCTGCATTAATGGACAGTTCTGATCATACATCTCGGGGAGAACCATGA

FIG. 22G

sseG

ATGAAACCTGTTAGCCCAAATGCTCAGGTAGGAGGGCAACGTCCTGTTAACGCGCCTGAGGAATCACCTCCATGTCCTTC
ATTGCCACATCCGGAACCAATATGGAGAGTGGTAGAATAGGACCTCAACAAGGAAAAGAGCGGGTATTGGCCGGAATTG
CGAAACGAGTGATAGAGTGTTTTCAAAAGAAATTTTAGTTGGCAACGGTTATTTTGGCGGACAGATTTTATGCTGT
TCCGCTGGAATAGCATTAAACAGTGCTAAGTGGTGGAGGCGCGCGCTCGTAGCCCTGGCAGGGATTGGCCTTGCTATTGC
CATCGCGGATGTCGCCCTGTCTTATCTACCATCATAAACATCATTGTCCTATGGCTCAGCAGATATAGGCAATGCCGTTT
TTTATATTGCTAATTGTTTCCGCAATCAACGCAAAAGTATGGCGATTGCTAAAGCCGCTCTCCCTGGGCGGTAGATTAGCC
TTAACCGCGACGTAATGACTCATTCTACTGGAGTGGTAGTTTGGGACTACAGCCTCATTATTAGAGCGTCTTAATGA
TATTACCTATGGACTAATGAGTTTTACTCGCTTCGGTATGGATGGGATGGCAATGACCGGTATGCAGGTGACAGCCCCAT
TATATCGTTTGTGCGCTCAGGTAACGCCAGAACAACGTGCGCCGGAGTAA

FIG. 22H

sseA

ATGAAAAAGACCCGACCCTACAACAGGCACATGACACGATGCGGTTTTTCCGGCGTGCGGCTCGCTGCGTATGTTGTT
GGATGACGATGTTACACAGCCGCTTAATACTCTGTATCGCTATGCCACGAGCTTATGGAGGTAAGAATTCGCGCGGCG
CAGCGCGACTTTTCAATTGCTGACGATATATGATGCCGCTGCTTACTGCTGCTTTCGGTTAGGGGAATGCTGCCAG
GCTCAAAACATTGGGGGGAAGCGATATACGCTTATGGACGCGCGGCACAAATTAAGATTGATGCGCGCAGGCGCCATG
GGCCGCGAGCGGAATGCTATCTCGCGTGTGATAACGTCTGTTATGCAATCAAAGCGTTAAAGGCCGTTGGTGCATTTGCG
GCGAGGTCAGTGAACATCAAATTTCCGACAGCGTGCAAAAAGATGTTACAGCAACTTTCTGACAGGAGCTAA

FIG. 22I

sseB

ATGATGATGAAAGAAGATCAGAAAAATAAAATACCCGAAGACATTCTGAAACAGCTATTATCCGTTGATCCGGAACCGT
TTATGCCAGTGGTTACGCCCTCATGGCAGGAGGGGATTATTCGCGCGCCGTAATCGATTTTAGTTGGCTGGTGATGGCCC
AGCCATGGAGTTGGCGTGCCCATATTGCAATGGCTGGCACCTGGATGATGCTTAAAGAATACACGACGCCATTAAATTC
TATGGACATGCTTGTGCTGGATGCCAGCCATCCAGAACCGGTTTACCAAACGGGCGTCTGTCTCAAATGATGGGGGA
ACCCGGGTTGGCGAGAGAGGCTTTCAAACCGCAATCAAGATGAGTTATGCGGATGCCTCATGGAGTGAGATTCCGCAGA
ATGCGCAAATAATGGTTGATACTCTTATTGCTTAA

27/31

FIG. 22J

ssaD

ATGGCATATCTCATGGTTAATCCAAAGAGTTCCTGGAAAAACGTTTTTTAGGTCACGTTTTACAAGGCCGGGAAGTATG
GCTGAATGAAGGTAACCTGTCACTGGGGGAGAAGGGATGCGATATTTGTATTCCGCTGGCTATAAATGAAAAATTATTC
TGAGAGAACAGGCAGATAGTTTATTTGTTGATGCCGGGAAAGCCAGAGTTAGAGTTAATGGCCGAGATTAAATCCAAAT
AAGCCGCTACCATCCAGTGGGGTTTTGCAGGTTGCGGGAGTGGCTATCGCGTTTGGTAAACAGGATTGTGAACCTTGCTGA
TTATCAAATACCCGTTTTCCAGATCAGGGTACTGGTGGTTGGCTGGCGTATCTTGATTTTCATCGGTGGAATGGGTGTCC
TGTTAAGTATTAGTGGTCAGCCTGAAACGGTAAATGACTTACCTTTGCGGGTTAAGTTTTTATTAGACAAAAGCAATATT
CATTATGTGCGGGCGCAATGGAAGAAGATGGCAGCCTGCAGTTGTCCGGTTATTGCTCGTCAAGCGAACAGATGCAAAA
GGTGAGAGCGACTCTCGAATCATGGGGGTGATGTATCGGGATGGTGAATCTGTGATGACTTATTGGTACGAGAAGTGC
AGGATGTTTTGATAAAAAATGGGTTACCCGCATGCTGAAGTATCCAGCGAAGGGCCGGGGAGCGTGTTAATTCATGATGAT
ATACAAATGGATCAGCAATGGCGCAAGGTTCAACCAATTACTTGCAGATATTCGCGGTTATTGCACTGGCAGATTAGTCA
CTCTCATCAGTCTCAGGGGATGATATTATTTCTGCGATAATAGAGAACGGTTTAGTGGGGCTTGTCATGTTAGCCCAA
TGCGGCGCTCTTTGTTATCAGTGGTGTACTGGATGAATCTCATCAACGCATTTTGCAAGAAACGTTAGCAGCATTAAAG
AAAAAGGATCCCGCTCTTTCTTTAATTTATCAGGATATTGCGCCTTCCCATGATGAAAGCAAGTATCTGCCTGCGCCAGT
GGCTGGCTTTGTACAGAGTGGCCATGGTAATTACTTATCTGACGAATAAAGAGCGTTTACGTGTAGGGGCATTGTTAC
CCAATGGGGGAGAAATTGTCCATCTGAGTGGCGATGTGGTAACGATTAAACATTATGATACTTTGATTAACTATCCATTA
GATTTTAAGTGA

FIG. 22K

ssaE

ATGACAACTTTGACCCGGTTAGAAGATTTGCTGCTTCATTGCGGTGAAGAGGCCAAAGGCATAATTTTACAATTAAGGGC
TGCCCGGAAACAGTTAGAAGAGAACACGGCAAGTTACAGGATCCGCGACAATATCAGCAAAACACCTTATTGCTTGAAG
CGATCGAGCAGGCCGAAAATATCATCAACATTATTTATTATCGTTACCATAACAGCGCACTTGTTAGTGAGTGAGCAAGAG
TAA

FIG. 22L

ssaG

ATGGATATTGCACAATTAGTGGATATGCTCTCCACATGGCGCACCAGGCAGGCCAGGCCATTAATGACAAAATGAATGG
TAATGATTTGCTCAACCCAGAATCGATGATTAAAGCGCAATTTGCCTTACAGCAGTATTCTACATTTATTAATTACGAAA
GTTCACTGATCAAAATGATCAAGGATATGCTTAGTGAATCATTGCTAAAATCTGA

FIG. 22M

ssaH

ATGTTTGGCGGCGTTAACCATAGCCTGATTTCCAGGTACATGCGATGTTACCAGCGCTAACGGTTATTGTTCCGGATAA
AAAATTACAGTTGGTATGTCTGGCATTATGTTGGCGGGTTTAAATGAGCCGCTAAAAGCCGCGAAAAATTTTATCGGATA
TAGATTTGCCAGAGGCTATGGCGCTGCGTCTGTTATTTCTGCAACCAATGAGGGGTTTGAAAATTGA

FIG. 22N

ssaI

ATGAGCGTAGTGCCTGTAAGCACTCAATCTTATGTAAAGTCCTCTGCAGAACCGAGCCAGGAGCAAATTAATTTTTTGA
ACAATTGCTGAAAGATGAAGCATCCACCAGTAACGCCAGTGCTTTATTACCGCAGGTTATGTTGACCAGACAAATGGATT
ATATGCAGTTAACGGTAGGCGTCGATTATCTTGCCAGAATATCAGGCGCAGCATCGCAAGCGCTTAATAAGCTGGATAAC
ATGGCATGA

FIG. 22O

ssaJ

ATGAAGGTTTCATCGTATAGTATTTCTTACTGTCTTACGTTCTTTCTTACGGCATGTGATGTGGATCTTTATCGCTCATT
GCCAGAAGATGAAGCGAATCAAATGCTGGCATTACTTATGCAGCATCATATTGATGCGGAAAAAAACAGGAAGAGGATG
GTGTAACCTTACGTGTCGAGCAGTCGAGTTTATTAATGCGGTTGAGCTACTTAGACTTAACGGTTATCCGCATAGGCAG
TTTACAACGGCGGATAAGATGTTTCCGGCTAATCAGTTAGTGGTATCACCCAGGAAGAACAGCAGAAGATTAATTTTTT
AAAAGAACAAAGAAATTGAAGGAATGCTGAGTCAGATGGAGGGCGTGATTAAATGCAAAAGTGACCATTTGCGCTACCGACTT
ATGATGAGGGAAGTAACGCTTCTCCGAGCTCAGTTGCCGATATTTATAAAATATTACCTCAGGTCAATATGGAGGCTTT
CGGGTAAAAAATTAAAGATTTAATAGAGATGTCAATCCCTGGGTTGCAATACAGTAAGATTAGTATCTTGATGCAGCCTGC
TGAATTCAGAATGGTAGCTGACGTACCCGCGAGACAAACATTCTGGATTATGGACGTTATCAACGCCAATAAAGGGAAGG
TGGTGAAGTGTTGATGAAAATACCCTTATCCGTTGATGTTATCGTTGACAGGACTGTTATTAGGAGTGGGCATCTCGATC
GGCTATTTTTGCGCTGAGACGCCGTTTTTGA

28/31

FIG. 22P

ssrA

ATGAATTTGCTCAATCTCAAGAATACGCTGCAAACATCTTTAGTAATCAGGCTAACTTTTTTATTATTAACAACAAT
AATTATTTGGCTGCTATCTGTCTTACCGCAGCTTATATATCAATGGTTTCAAGAAACGGCAGCATATAATAGAGGATTAT
CCGTTCTATCCGAGATGAATATTGTACTAAGCAATCAACGGTTTGAAGAAGCTGAACGTGACGCTAAAAATTTAATGTAT
CAATGCTCATTAGCGACTGAGATTTCATCATAACGATATTTTCCCTGAGGTGAGCCGGCATCTATCTGTCCGTCCTTCAA
TTGCACGCCGACGCTAAACGGAGAGAGACCGTCTCTTTCTGCAGTCCCTCTGATATCGATGAAAAATAGCTTTCGTCCG
ATAGTTTTATTCTTAATCATAAAAAATGAGATTTCTGTTATTATCTACTGATAACCCCTTCAGATTATTCAACTCTACAGCCT
TTAACCGCGAAAAAGCTTTCCTTTATACCCAACCCATGCGGGTTTTACTGGAGTGAACCAGAATACATAAACGGCAAAGG
ATGGCAGCTTCCGTTGCGGTTGCCGATCAGCAAGCGGTTATTTTTGAGGTGACGGTTAAACTTCCCGATCTCATTACTA
AGAGCCACCTGCCATTAGATGATAGTATTGAGTATGGCTGGATCAAAACAACCACTTATTGCCGTTTTTCATACATCCCG
CAAAAAATACGTACACAGTTAGAAAAATGAACGCTGCATGATGGATGGCAGCAAATTCGCGGATTTCTGATATTACGCAC
AACCTTGATGAGCCCGGATGGAGTCTGGTTACGCTGTACCCATACGGTAATCTACATAATCGCATCTTAAAAATTTATCC
TTCAACAAATCCCTTTACATTAAACAGCATTGGTGTGATGACGTCGGCTTTTGTGCTTACTACATCGCTCACTGGCC
AAACCGTTATGGCGTTTTGTGATGTCATTATAAAACCGCACTGCACCGCTGAGCACACGTTTACCAGCACAACGACT
GGATGAATTAGATAGTATTGCCGCTGCTTTTAAACCACTGCTTGATCTCTACAAGTCCAATACGACAATCTGGAAAAACA
AAGTCGCGAGAGCGCACCAGGCGCTAAATGAAGCAAAAAACGCGCTGAGCGAGCTAACAAACGTAAAAGCATTCTCTT
ACGGTAATAAGTCATGAGTTACGTACTCCGATGAATGGCGTACTCGGTGCAATTGAATTATTACAAACCAACCCCTTTAAA
CATAGAGCAACAAGGATTAGCTGATACCGCCAGAAATTTGATACACTGTCTTTGTTAGCTATTATTAAATAATCTGCTGGATT
TTTACGCGATCGAGTCTGGTCATTTACATTACATATGGAAGAAACAGCGTTACTGCCGTTACTGGACCAAGGCAATGCAA
ACCATCCAGGGGCCAGCGCAAAGCAAAAACTGTCTATTACGTACTTTTGTGCGTCAACATGTCCCTCTCTATTTTCATAC
CGACAGTATCCGTTTACGCGCAATTTTGGTTAATTTACTCGGGAACGCGGTAAAAATTTACCGAAACCGGAGGGATACGTC
TGACGGTCAAGCGTCATGAGGAACAATTAATATTCTGTTTAGCGATAGCGGTAAAGGGATTGAAATACAGCAGCAGTCT
CAAACTTTTACTGCTTTTTATCAAGCAGACACAAATTCGCAAGGTACAGGAATTGGACTGACTATTGCGTCAAGCCTGGC
TAAATGATGGGCGGTAATCTGACACTAAAAAGTGTCCTCCGGGGTTGGAACCTGTGTCTCGCTAGTATTACCTTACAAG
AATACCAGCCCGCTCAACCAATTAAGGGACGCTGTGACGCGCGTTCTGCTGCATCGGCAACTGGCTTGCTGGGGAATA
CGCGGTGAACCAACCCACAGCAAAATGCGCTTCTCAACGACAGAGCTTTTGTATTCTCGGAAAACTCTACGACCTGGC
GCAACAGTTAATATTGTGTACACCAATATGCCAGTAATAAATTTGTTTACCACTGGCAGTTGCGAGATTCTTTGG
TTGATGATGCCGATATTATCGGGATATCATCGGCAAAATGCTTGTGACGCTGGGCCAACACGTCATATTGCCGCGAGT
AGTAACGAGGCTCTGACTTTATCACAACAGCAGCGATTGATTTAGTACTGATTGACATTAGAATGCCAGAAATAGATGG
TATTGAATGTGTAGGATTATGGCATGATGAGCCGAATAATTTAGATCCTGACTGCATGTTTGTGGCACTATCCGCTAGCG
TAGCGACAGAAGATATTCTGTTGTAATAAAAAATGGGATTTCATCATTACATTACAAAACAGTGACATTGGCTACCTTA
GCTCGCTACATCAGTATTGCCGAGAAATACCAACTTTTACGAAATATAGAGCTACAGGAGCAGGATCCGAGTCGCTGCTC
AGCGCTACTGGCGACAGATGATATGGTCATTAAATAGCAAGATTTTCAATCACTGGACCTCTTGCTGGCTGATATTGAAA
ATGCCGATCGCTGGAGAAAAATCGATCAGTTAATTCACACATTAAAAGGCTGTTTAGGTCAAATAGGGCAGACTGAA
TTGGTATGCTATGTCATAGACATTGAGAATCGCGTAAAAATGGGAAAAATCATCGCGCTGGAGGAATAACCGACTTACG
CCAGAAAAATACGTATGATCTTCAAAAACTACACCACTTAA

FIG. 22Q

ssrB

ATGAAAGAATATAAGATCTTATTAGTAGACGATCATGAAATCATATTAAACGGCATTATGAATGCCTTATTACCCTGGCC
TCATTTTAAAAATGTTAGAGCATGTTAAAAATGGTCTTGAGGTTTATAATGCTGTGTGTCATACGAGCCTGACATACTTA
TCCTTGATCTTAGTCTACCTGGCATCAATGGCCTGGATATCATTCCTCAATTACATCAGCGTTGGCCAGCAATGAATATT
CTGGTTTACACAGCATACCAACAAGAGTATATGACCATTAAACTTTAGCCGAGGTGCTAATGGCTATGTTTTAAAAAG
CAGTAGTCAGCAAGTTCTGTTAGCGGCATTGCAACAGTAGCAGTAAACAAGCOTTAATTGACCCACGTTGAATCGGG
AAGCTATCTGGCTGAATTAACCGCTGACACGACCAATCATCAACTGCTTACTTTGCGCGAGCGTCAGGTTCTTAACTT
ATTGACGAGGGGTATACCAATCATGGGATCAGCGAAAAAGCTACATATCAGTATAAAAAACCGTCGAAACACACCGGATGAA
TATGATGAGAAAGCTACAGGTTTATAAAGTGACAGAGTTACTTAACTGTGCCGAAGAATGAGGTTAATAGAGTATTAA

FIG. 23A

SseA

MMIKKKAAPSEYRDLEQSYMQLNHCLKKPHQIRAKVSSQLAERAESPKNRSRETESILHNLFPQGVAGVNGEAEKDLKKIV
SLPKQLEVRKLQNLNAQAPVEIPSGKTKR

29/31

FIG. 23B

SseB

MSSGNILWGSQNPIVFKNSFGVSNADTGSQDDLSQQNPFAEGYGVLLILLMVIQAIANNKFIEVQKNAERARNTQEKSNEMDEVIKAAKGDAKTKEEVPEDVIKMRDNGILIDGMTIDDYMAKYGDHGKLDKGGLOAIKAAALDNDANRNTDMSQGGITIQKMSQELNAVLTLTGLISKWGEISSMIAQKTY

FIG. 23C

SseC

MNRIHSNSDSAAGVTALTHHLSNVSCVSSGSLGKRQHRVNSTFGDGNAACLLSGKISLQEASNALKQLLDVPGNHRP
SLPDFLQTNPAVLMMMTSLILNVFGNNAQSLCQQLERATEVQNALRNKQVKEYQEQIQKAEQEDKARKAGIFGAIFDW
ITGIFETVIGALKVVEGFLSGNPAEMASGVAYMAAGCAGMVKAGAETAMMCGADHDTQCAIIDVTSKIQFGCEAVALALD
VFQIGRAFMATRGLSGAAAKVLDSQFGSEVVERMVGAGEAEIEELAEKFGEVSESFSKQFEPLEREMAMANEMAEAAE
FSRNVENNMTRSAGKSFTEGVIKAMAKEAAKEALEKCVQEGGKFLKKCFRNKVLNMFKKILYALLRDCSFKGLQAIRCA
TEGASQMNMTGMVNTKAKIEKKIEQLITQQRFLDFIMQQTENQKKIEQKRLEELYKGTGAALRDVLOTIDHYSSVQARIA
GYRA

FIG. 23D

SseD

MEASNVALVLPAPSLLTSPSTSPSGEGMGTESMLLLFDDIWMKLMELAKKLRDIMRSYNVEKQRLAWELQVNVLTQMK
TIDEAFRASMITAGGAMLSGVLITGLGAVGGETGLIAGQAVGHTAGGVMGLGAGVAQRQSDQDKAIADLQONGAQSYNKS
LTEIMEKATEIMQIIGVGSSLVTVLAEILRALTR

FIG. 23E

SseE

MVQETEQWLRRHQVFTPEPAYLGETAILLGQQFILSPYLVYIRIEAKEMIICEFRRLTPGQPRPQQLFHLGLLRGIFVHH
PQLTCLKMLIITDVLDEKKAMLRRLRLRLITVMGATFTQLDQDNWTVLSAEHLIQRRF

FIG. 23F

SseF

MKIHIPSAASNIVDGNSPPSDIQAKEVSFPPEIPAPGTPAAPVLLTPEQIRQORDYAIHFMQYTTIRALGATVVFGLSVA
AAVISGGAGLP IAILAGAAALVIAIGDACCAYHNYQSICQKEPLQTASDSVALVVSALALKCGASLNCANTLANCLSLLI
RSGIAISMLVLPQFPPLPAENIAASLDMGSVITSVSLTAIGAVLDYCLARPSGDDQENSVDLHADPSVLLAEQMAALC
QSATTAPALMDSSDHTSRGEP

FIG. 23G

SseG

MKPVPNAQVGGQRPVNAPEESPPCPSLPHPETNMESGRIGPQQKERVLAGLAKRVIECFPKEIFSWQTVILGGQILCC
SAGIALTVLSGGGAPLVALAGIGLATAIADVACLIYHHKHLPMADHSIGNAVFYIANCFANQRKSMAIAKAVSLGGRLA
LTATVMTHSYWGSGLGLQPHLLERLNDITYGLMSFTRFGMDGMAMTGMQVSSPLYRLLAQVTPEQRAPE

FIG. 23H

SseA

MKKDPTLQQAHDTRMFRRGGSLEMLLDDDVTPPLNTLYRYATQLMEVKEFAGAARLFQLLTIYDAWSFDYWFRLGECCO
AQKHWEAIYAYGRAAIKIDAPQAPWAAAEACYLACDNVCYAIKALKAVVRICGEVSEHQILRQRAEKMLQQLSDRS

FIG. 23I

SseB

MMKEDQKNKIPEDILKQLLSVDPETVYASGYASWQEGDYSRAVIDFSWLVAQPSWRAHIALAGTWMLKEYTTAINF
YGHMLDASHPEPVYQTGVCLKMGEPGLAREAFQTAIKMSYADASWSEIRQNAQIMVDTLIA

30/31

FIG. 23J

SsaD

MAYLMVNPVKSSWKIRFLGHVLOGREVWLNENGLSLGKGCDCIPLAINEKIILREQADSLFVDAGKARVRVNGRRFPNP
KPLPSSGVLQVAGVAIAFGKQDCELADYQIPVSRSGYWWLAGVFLIFIGGMGVLLSISGQPETVNDLPLRVKFLLDKSN
HYVRAQWKEDGSLQLSGYCSSEQMQKVRATLESWGVMYRDGVICDDLVRVQDVLIKMGYPHAEVSSEPGSVLIHDD
IQMDQQRKQVQPLLADIPGLLHWQISHSHQSQDDIIISAIENGLVGLVNVSPMRRSFVISGVLDESHQRILOETLAALK
KKDPALSLIYQDIAPSHDESKYLPAPVAGFVQSRHGNVLLLTNKERLRVGALLPNGGEIVHLSADVVTIKHYDTLINVPL
DFK

FIG. 23K

SsaE

MTTLTRLEDLLHSREEAKGIIQLRAARKQLEENNGKLQDPQQYQONTLLLEAIEQAENIINIYYRYHNSALVVSEQE

FIG. 23L

SsaG

MDIAQLVDMLSHMAHQAGQAINDKMNGNDLLNPESMIKAQFALQQYSTFINYESSLIKMIKMDLSGIIAKI

FIG. 23M

SsaH

MPAGVNHSLISQVHAMLPAITVIVPDKKLQLVCLALLLAGLNEPLKAAKILSDIDLPEAMALRLLFPAPNEGFE

FIG. 23N

SsaI

MSVVPVSTQSYVKSSAEPSQEQINFPEQLLKDEASTSNASALLPQVMLTRQMDYMQLTVGVDYLARISGAASQALNKL
DNMA

FIG. 23O

SsaJ

MKVHRIVFLTVLTFLLTACDVLRYSLPEDEANQMLALLMQHHIDAEEKQEEDGVTLRVEQSOFINAVELLRLNGYPHRO
FTTADKMPFANQLVVSPOEEQQKINFLKEQRIEGLMSQMEGVINAKVTIALPTYDEGSNASPSSVAVFIKYSPOVNMEAF
RVKIKDLIEMSIPLQYSKISILMQPAEFMRVADVPARQTFWIMDVINANKGKVVKWLKYPYPLMLSLTGILLGVGILI
GYFCLRRRF

FIG. 23P

SsaA

MNLLNLKNTLOTSLVIRLTFLLTTIIIWLLSVLTAAYISMVQKRQHIIEDLSVLSENNIVLSNQRFEAEERDAKNL
MYQCSLATEIHNDIFPEVSRHLSVGPSTCTPTLNGEKHRLFLQSSIDENSFRRDSFILNHKNEISLLSTDNPSDYSTLQ
P LTRKSPFLYPHAGFYWSEPEYINGKGWHASVAVADQQGVFEVTVKLPDLITKSHLPLDDSIKRVWLDQNNHLLPFSYIP
QKIRTQLENVTLEDGWQQIPGFLILRTTLHGPGWSLVTLYPGNLHNRIKILQQIPFTLTALVMTSAPFCWLLHRS
LA KPLWRFPVDVINKTATAPLSTRLPQRLDELDSIAGAFNQLDQVQYDNLENKVAERTQALNEAKKRAERANKRKS
IHLTVISHELRTPMNGVLGAIELLQTTPLNIEQQGLADTARNCTLSLLAIINNLLDFSRIESGHFTLHMEETALLP
LLDQANQTIQGPQSKLSLRTFVGQHVPLYFHTDSIRLQILVNLQNAVKTETGGIRLTVKRHEEQILFLVSDSGK
GIEIQQS QIFTAFYQADTNSQGTGIGLTIASSLAKMMGGNLTLSVPGVGTCSVLPLQEYQPPQFIKGTLSAP
FCLHRQLACWIRGEPPHOONALLNAELLYFSGKLYDLAQQLILCTPNMPVINNLLPPWQLQILLVDDADINRDI
IGKMLVSLGQHVTTIAS SNEALTLSQQQRFDLVLIDIRMPEIDGIECVRLWHDEPNLDPDCMFVALSASVATED
IHRCKKNGIHHYITKPVTLATLARYISIAAEYQLLRNIELQEQDPSRCSALLATDDMVINSKIFQSLD
LLLDIENAVSAGEKIDQLIHTLKGCLGQIGQTE LVCYVIDIENRVKMGKIALAELTDLRQKIRMIFKNYTT

31/31

FIG. 23Q

SsrB

MKEYKILLVDDHEIIINGIMNALLPWPFPKIVEHVKNGLVYNACCAYEPDILILDLSLPGINGLDIIPQLHQRWPMNI
LVYTAYQQEYMTIKTLAAGANGYVLKSSSQVLLAALQTVAVNKRYIDPTLNREAILAELNADTTNHQLTLRERQVLKL
IDEGYTNHGISEKLHISIKTVETHRMNMMRKLQVHKVTELLNCARRMLIEY

FIG. 24A

Promoter A2

GCTTCCTCCAGTTGCCTGTTGCAAAATCTTTGGCACTTGATCACTATCGCAGTACATATAGTTTCATCAGAAGATTAAT
CGATGGTGTATCATTAGGAAGATAAAATTTCTTCATATATAACCCAGTCGATGACTACAATTACTTTTTAATAAGATGGC
GATGTAAAAACATCGTAACAGTTTATTTAATAAATAATTTTCAAATTGTAAGTTTTATGTCAATGCTGAAAATGTAAT
TGTGAATTTATCGGAAAATCCGAATGATAGAATCGCCTGTGACAAGGTATATGTAGACAGCATCCTGATATTGTACAAGA
AGAGATAGTCGAAATAAATGTGAATCAGGCTTTTACGGATGTGTTGTGAGCGAATTGATAGAAAC

FIG. 24B

Promoter B

TAAAAATATCTTAGAGCCTATCCCACCAGGCGTTAATTGGCGCAGCCAGTTTGACACGGATAGCGCGCAAAAACCGCAG
CGTACACGTAGTACGTGAGGTTTGACTCGCTACGCTCGCCCTTCGGGCCGCCGCTAGCGGCGTTCAAACGCTAACGCGT
TTTGGCGAGCACTGCCAGGTTCAAAATGGCAAGTAAATAGCCTAATGGGATAGGCTCTTAGTTAGCACGTTAATTATC
TATCGTGTATATGGAGGGGAAT